GRAYCARY

1625 Massachusetts Avenue NW, Suite 300
Washington, DC 20036-2247
www.graycary.com
O] 202-238-7766
F] 202-238-7701

December 3, 2003

Ms. Marlene H. Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington, DC 20554

Re: Ex Parte Presentation: Amendment of Part 2 of the Commission's Rules to Allocate Spectrum Below 3 GHz for Mobile and Fixed Services to Support the Introduction of New Advanced Wireless Services, including Third Generation Wireless Systems (ET Docket No. 00-258)

Dear Ms. Dortch:

This letter is written on behalf of our client, IPWireless, Inc. ("IPWireless"). IPWireless is a leading developer of third generation ("3G") mobile and portable technologies conforming to the ITU's UMTS standard. IPWireless currently supplies advanced wireless broadband solutions to service providers in Europe and Asia/Pacific nations as well as in the United States.

Since the Commission commenced the 3G allocation proceeding, and particularly over the past several months, IPWireless has seen a dramatic increase in support for worldwide, broad-scale deployment of time division duplex ("TDD") 3G systems. In Recommendation ITU-R M.1036-2 at Table 2, the ITU has designated several bands for TDD use, depending upon the bands already in use for cellular service in particular countries. Of the six frequency arrangements in the ITU Recommendation, five include all or some portion of the 1900-1920 MHz band, and two also include the 2010-2025 MHz band. Consistent with the ITU Recommendation, a number of administrations, particularly in Europe and Asia, have allocated spectrum for TDD use and either authorized trial systems or awarded operator licenses for spectrum in the 1900-1920 MHz band, the 2010-2025 MHz band, or in both bands. [1] A list of some of the spectrum holders in the 1900-1920 MHz and 2010-2025 MHz bands is provided in Exhibit A. Some of the world's largest mobile system operators, including Orange, Vodafone, T-Mobile and Hutchison, hold licenses for 3G TDD spectrum. The 3G TDD systems already in trial or in commercial service include those summarized in the table in Exhibit B.[2] In addition, IPWireless is in contract negotiations with a large multinational

[1] The emergence of TDD as a mainstream mobile technology is evidenced by the allocation of 135 MHz for TDD operation in China and over 100 MHz for TDD operation in Korea.
[2] Although all of the current trials and commercial operations in Europe are in the 1900-1920 MHz band, the 2020-2025 MHz band is also available in Europe, consistent with the European Radiocommunications Committee's Decision of November 29, 1999 (ERC/DEC/(99)25)
(footnote continued on next page)

operator. If those negotiations prove successful, TDD will be commercially deployed in several additional European countries.

We believe that everywhere in the world where 3G TDD spectrum has been allocated, 3G TDD will be widely deployed in the next few years. Third generation TDD will be deployed in those European countries where it was auctioned as a package with paired FDD spectrum; carriers have paid for the spectrum and are motivated to use it. Similarly, in Asia, governments will demand that the spectrum allocated for 3G TDD be used.

In the instant proceeding, the FCC is considering various options for the use of several bands, namely the 1910-1930 MHz, 1990-2000 MHz, 2020-2025 MHz and 2155-2180 MHz bands. IPWireless urges the Commission to designate for TDD use the two available bands that overlap the increasingly popular international TDD bands (*i.e.,* 1910-1920 MHz and 2020-2025 MHz). By designating these bands for TDD operation, the Commission would promote the attainment of many of the same public benefits the United States recently achieved through its successful effort at WRC-03 to harmonize the 5 GHz UNII bands internationally.

International harmonization of the TDD 3G bands would facilitate the manufacture and use of advanced wireless broadband devices on a worldwide basis, benefiting consumers through lower product prices as the result of long production runs of user equipment. Service providers would achieve similar savings as the result of volume production of base station equipment, and would also be able to offer international roaming service on common frequency blocks without the added costs associated with production and distribution of equipment capable of operating on as many as four or five discrete and widely separated frequency bands. Although the Commission has historically paid relatively little attention to the benefits of harmonizing its band plan with those in other countries, this has begun to change, as evidenced by the leadership role assumed by the U.S. at WRC-03 to gain adoption of a worldwide harmonized band plan for unlicensed use in the 5 GHz band. The prospect for international harmonization of the band plan likewise exists in the 1910-1920 and 2020-2025 MHz bands. Although the U.S. has moved more slowly than many other nations to allocate spectrum for 3G services, this need not place U.S. companies and consumers at a disadvantage. Presumably, a considerable portion of the worldwide subscriber base can be expected to travel internationally, and will appreciate the convenience and cost savings of being able to use the same handset wherever they go. The adoption of an internationally harmonized band plan for 3G TDD would likely make the U.S. spectrum more attractive to multi-national operators, potentially resulting in higher winning bids at the 3G spectrum auction, to the ultimate benefit of the U.S. Treasury and American taxpayers.

Finally, to provide sufficient spectrum for multiple operators, it is important that the total amount of spectrum available for TDD use in the U.S. be commensurate with that available in other countries. In Europe, this is 25 MHz (i.e., 1900-1920 MHz plus 2020-2025 MHz) and it is comparable, or even greater, in other countries. To provide a comparable opportunity for operators

---

(footnote continued from previous page)
Licenses have been awarded in this band in Germany, the Netherlands and Austria. In other countries, this frequency block is available for 3G TDD use, but no licenses have been awarded for 2020-2025 MHz because no applicant has sought a license for this band.

to serve the U.S. market, IPWireless recommends that, in addition to the 1910-1920 MHz band and 2020-2025 MHz, (a total of 15 MHz) the FCC designate an additional ten MHz from the 2155-2180 MHz band for TDD operation. The spectrum blocks assigned to each operator should be in increments of 5 MHz, as 3G TDD equipment internationally is designed to operate with 5 MHz channel spacing. Aggregation of 5 MHz channels should be permitted.

Some parties have expressed concern that TDD and FDD systems cannot co-exist in close proximity. IPWireless has extensive experience with TDD/FDD co-existence issues as the result of technical testing conducted in conjunction with Nortel Networks earlier this year. The tests were conducted outside Paris, and used the 1900-1920 TDD band immediately adjacent to the FDD Uplink band at 1920-1980 MHz. The results of the testing demonstrated that adjacent channel TDD and FDD systems can co-exist and be co-sited. The technical trial is described in Exhibit C and further information on FDD/TDD co-existence and co-siting is provided in the PowerPoint presentation attached as Exhibit D.

IPWireless recognizes that there are competing interests vying for these spectrum blocks, including parties seeking paired spectrum for FDD operation and other parties facing potential relocation from the 800 MHz and MDS bands. IPWireless takes no position on whether the spectrum in question should be awarded to those being displaced from other bands or via auctions. However, whoever receives this spectrum should receive it under a TDD designation.

IPWireless believes that, whoever controls the spectrum, the public would be best served by designation of 1910-1920 MHz, 2020-2025 MHz and ten megahertz from the 2155-2180 MHz band for use by TDD technologies in 5 MHz block increments.

Sincerely,

Gray Cary Ware & Freidenrich LLP

Larry A. Blosser
lblosser@graycary.com

LAB:lb

cc: Bruce Franca
Alan Scrime
Geraldine Matise
Ira Keltz
Shameeka Hunt
Gary Thayer
Jamison Prime

Exhibit A

TDD Spectrum Holders in Europe, the Middle East and Africa (EMEA) in the 1900-1920 MHz band

3G Blue
Airtel Móvil
Ålands
Amena
Bouygues Telecom
Cellcom
Centretel
CosmOTE
Dutchtone
EMT
E-Plus
EPT
Europolitan
Eurotel
France Telecom
Group 3G
HI3G
IPSE
KPN
Latvijas Mobilais
Libertel
LuXcommunications
Max.mobile
MobilCom
Mobilkom
Mobiltelefon
Mobitel
Netcom GSM
O2
Omnitel
One2One
Oni way
Optimus
Orange
Panafon
Partner
Pele-phone
Polkomtel
PTC
Radiolinja
SFR
Sonera
Song Networks
STET Hellas
Sunrise
Suomen 3G
Swisscom
Tango S.A.
TDC Mobile
Team 3G
Tele2
Telecel
Telefónica Móviles
Telenor
Telia
Telia Mobile
TIM
TMN
T-Mobil
VIAG
Vodafone D2
Vodafone Ireland
Wind
Xfera

TDD Spectrum Holders in Asia/Pacific Region (Partial List)

Chunghwa Telecom
CKW Wireless (Aust)
CSL (Hong Kong)
HI3G (Hong Kong)
MobileOne (Singapore)
Optus (Australia)
SmarTone 3G (Hong Kong)
Starhub Mobile (Singapore)
STM
SUNDAY 3G (Hong Kong)
Vodafone (Australia)
Taiwan Cellular
Taiwan PCS
Telecom NZ
Telekom Malaysia
Telstra (Australia)
UMTS (Malaysia)
Vodafone NZ
Yuan-Ze Telecom

Exhibit B

Current Worldwide Trials and Commercial Deployments of TDD Systems
in the 1900-1920 MHz and 2010-2025 MHz Bands

Country	Band	Number of Operators
Singapore	1900-1920 MHz	2
Malaysia	2010-2025 MHz	1
Japan	2010-2025 MHz	2
China	1900-1920 MHz 2010-2025 MHz	1 1
United Kingdom	1900-1920 MHz	3
Germany	1900-1920 MHz	1
France	1900-1920 MHz	1
Italy	1900-1920 MHz	2
Ireland	1900-1920 MHz	2
Spain	1900-1920 MHz	1
Portugal	1900-1920 MHz	1
Austria	1900-1920 MHz	1
Czech Republic	1900-1920 MHz	1

Exhibit C

IPWireless Announces the World's First, Fully Interoperable, 3G Network for Mobile Voice and Broadband Data

IPWireless Successfully Completes Interoperability and Co-Existence Tests

SAN BRUNO, CA - June 25, 2003 - IPWireless has successfully completed the world's first interoperability (IOT) and co-existence testing between UMTS TDD (TD-CDMA) and UMTS FDD (WCDMA) networks at Nortel Networks wireless headquarters in Châteaufort, France. The test, completed during a trial of the IPWireless™ TDD solution, demonstrated that both FDD and TDD standards of 3G UMTS can co-exist in the same cell site and interface together as one network solution.

The tests also showed the co-existence of both FDD and TDD Node Bs at the same cell site without any interference or degradation of service using paired and unpaired spectrum allocations. These findings prove conclusively that mobile network operators can safely offer the high-bandwidth low-latency services available on a TDD network on the cell sites with existing or planned FDD deployments.

Chris Gilbert, CEO of IPWireless said, "This is another important step for IPWireless, demonstrating that there is a UMTS solution for operators unpaired TDD spectrum which can leverage and work seamlessly with other UMTS solutions. This solution will allow operators to offer a host of attractive new services that have proven market appeal."

The world's first IOT test integrated IPWireless' TDD Radio Access Network (RAN) via the Iups interface (between RNC and SGSN) with Nortel Networks market leading packet core solution, which is deployed by a number of major European operators.

Alain Biston, president and general manager, UMTS Networks, Nortel Networks said, "This test with IP Wireless demonstrates the high interoperability of our intelligent packet core solution with multiple wireless access technologies."

IPWireless is supplying their 3GPP standards compliant UMTS TDD Mobile Broadband technology equipment including Node Bs, Integrated Network Controllers and end user PC cards (PCMCIAs). Via the PC card, the IPWireless solution gives laptop and PDA users mobile Internet access at speeds up to 1.5Mbps - faster than the fixed line Broadband rates currently available. In a fully deployed network, broadband coverage is as ubiquitous as with today's GSM networks. This offers a multitude of new revenue streams for mobile network operators and the services that business and residential users are demanding.

About IPWireless

IPWireless offers mobile broadband, an extremely disruptive technology that is on track to change the way people around the world communicate, access the Internet, and use a host of applications at home, at the office, or on the road. IPWireless has quickly established itself as a leader in the market, with commercial deployments around the world and trials with ten of the top twenty global wireless operators. IPWireless has announced strategic partnerships and relationships with some of the largest companies in the industry, including Alcatel and Solectron. Founded in April 1999, IPWireless is led by a world-class management team of seasoned entrepreneurs and technology and marketing executives from leading mobile and communication companies including Cisco, Lucent, Motorola, and Qualcomm. The company, backed by more than $150 million in funding from leading venture capital firms, is headquartered in San Bruno, California, with R&D and sales facilities based in the U.K. For more information about IPWireless, visit the company's Web site at www.ipwireless.com.

###

For further press information contact:

Ross Perich
Trainer Communications
(925) 556-5463
ip@trainercomm.com

Guy Douglas
Brodeur
+44 (0)1753 790700
gdouglas@uk.broduer.com

Mark Pittick
IPWireless UK
+44 (0)1666 828753
mpittick@ipwireless.com

Exhibit D

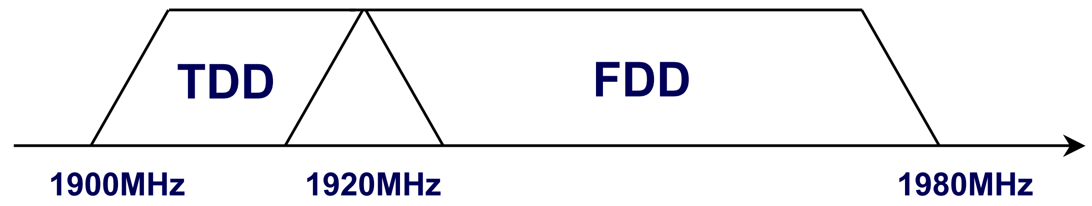
IPWireless

FDD and TDD Co-existence and Co-siting

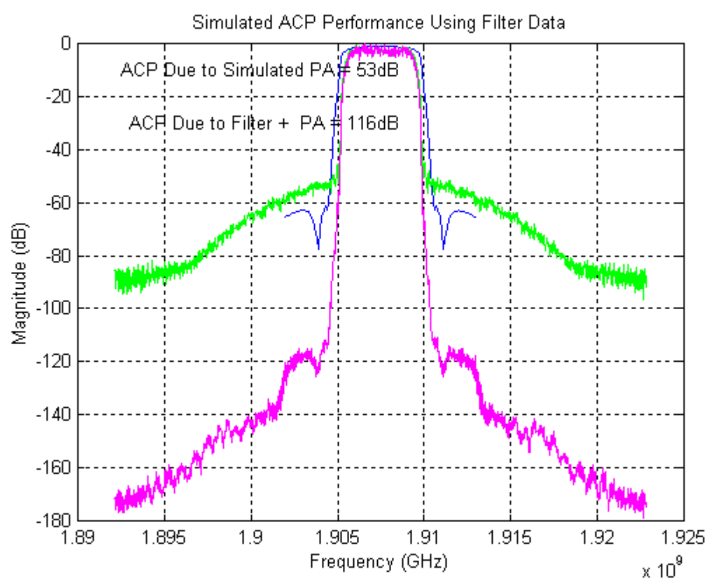
FDD and TDD Co-existence and Co-siting

- RF Issues
  - TDD and FDD allocations immediately adjacent
    - TDD 1900-1920MHz
    - FDD
      - Uplink 1920-1980MHz
      - Downlink 2110-2170MHz
- Node-B to Node-B – deterministic analysis required
  - Two issues to address
    - TDD Adjacent Channel Interference – solved with Node-B filter
    - FDD Receiver Blocking – solved with site engineering solution
  - Three scenarios to consider
    - FDD Macro TDD Macro Antenna Sharing
    - FDD Macro TDD Macro Co-Siting
    - FDD Macro TDD Micro Co-Siting
- UE to UE - probabilistic analysis required
  - Analysis is more involved
    - This shows that the problem is minimal
- TDD and FDD can Co-exist and be Co-sited

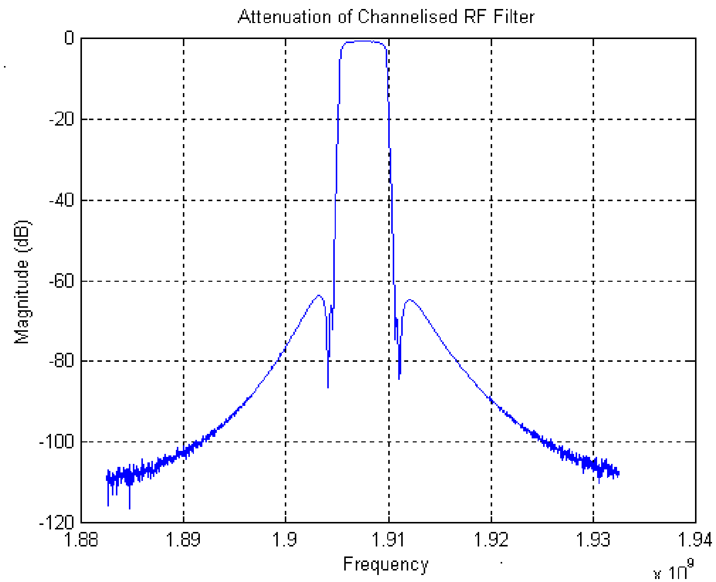
TDD Adjacent Channel Interference - 1



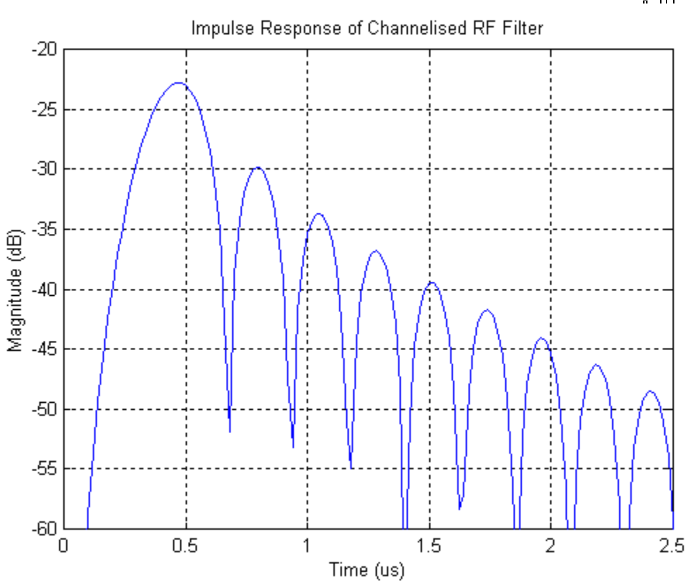
TDD Node-B Transmit Power	+34dBm
Adjacent Channel Leakage Ratio after HPA	-55dB
Adjacent Channel Power after HPA	-21dBm
TDD Transmit Filter Rejection	59dB
Adjacent Channel Power for Co-Siting (3GPP 25.105)	-80dBm
TDD/FDD Duplexer or Antenna Isolation	30dB
Leakage into FDD Node-B Rx (for 1dB noise rise)	-110dBm

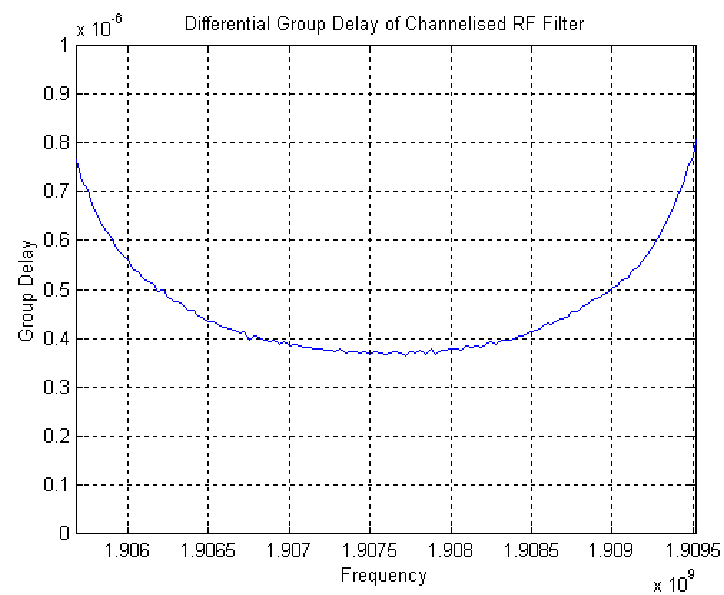


TDD Adjacent Channel Interference - 2



- Filter is an 8 section cavity resonator
- Measures 12.5x25.0x5.0 cm
- Fits inside Node-B housing
- Costs ~$500-$750 in volume
- Measured responses as per simulation
- Insertion loss is <1.0dB
- Group delay acceptable





FDD Receiver Blocking - 1

- There is no explicit blocking specification for TDD in the FDD Node-B specification TS25.104
- This is because the difficulty in achieving this critically depends on the operators allocation and it was not considered appropriate to tie the standard to the worst case.
- Hence the default blocking specification for TDD is -52dBm for the first adjacent channel and -40dBm for all others.
- However the blocking specification for GSM1800 of +16dBm will result in higher performance than this in TDD channels away from the boundary.
- Operator specific site engineering solutions for co-siting addressing the blocking issue are referred to in TS25.104.

FDD Receiver Blocking - 2

- Operator specific site engineering solutions detailing additional filtering in the FDD receive path are specified in TR25.942.
- It is concluded that co-siting is possible for all operator configurations except the first adjacent channel.
- A TDD transmit power of +46dBm (+43dBm , +3dB multicarrier) is assumed.
- However, there is a 12dB difference between the specifications for the first adjacent channel and all other channels.
- Therefore this implies operating at a -12dB reduced power of +34dBm facilitates co-siting for all channels.
- The additional isolation required can be provided for in a number of ways depending on the scenario.

Additional isolation required for blocking

Assuming no improvement over standard blocking specification

TDD channel	Additional Isolation For 6dB de-sense FDD noise floor -104dBm	Additional Isolation For <1dB de-sense FDD noise floor -104dBm
Adjacent channel 1917MHz	86dB	98dB
All other channels 1902MHz, 1907MHz, 1912MHz	74dB	86dB

Solutions for the Three Scenarios

- FDD Macro TDD Macro Antenna Sharing
- FDD Macro TDD Macro Co-Siting
- FDD Macro TDD Micro Co-Siting

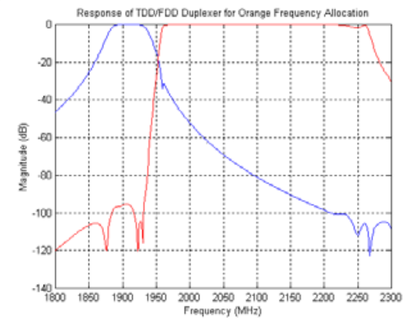
IPWireless

FDD Macro TDD Macro Antenna Sharing -1

Operator specific solution example for Orange UK Allocation

FDD equipment assumed to satisfy 3GPP FDD blocking spec. for TDD -40dBm (TS25.104 section 7.5.1) but this results in 6dB desensitisation!

For interference free operation or 0.8dB desensitisation TDD signal must be <-52dBm Hence, Duplexor must provide +34-(-52) = 86dB rejection in TDD band



FDD Node-B

Downlink,
2160-2170MHz
Uplink,
1970-1980MHz

?

Duplexor

>30dB isolation

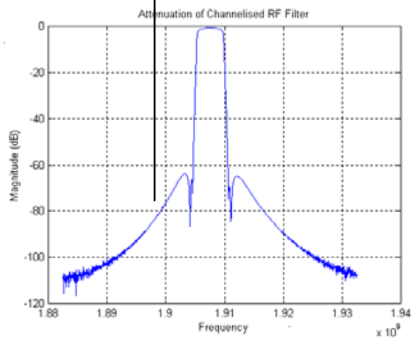
TDD Node-B

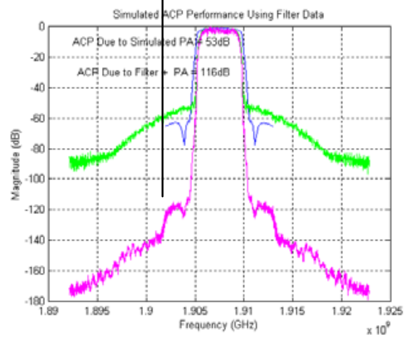
Downlink/Uplink,
1905-1910MHz

Transmit Filter

>10dB rtn. loss

Insertion loss = 0.4dB on both FDD and TDD

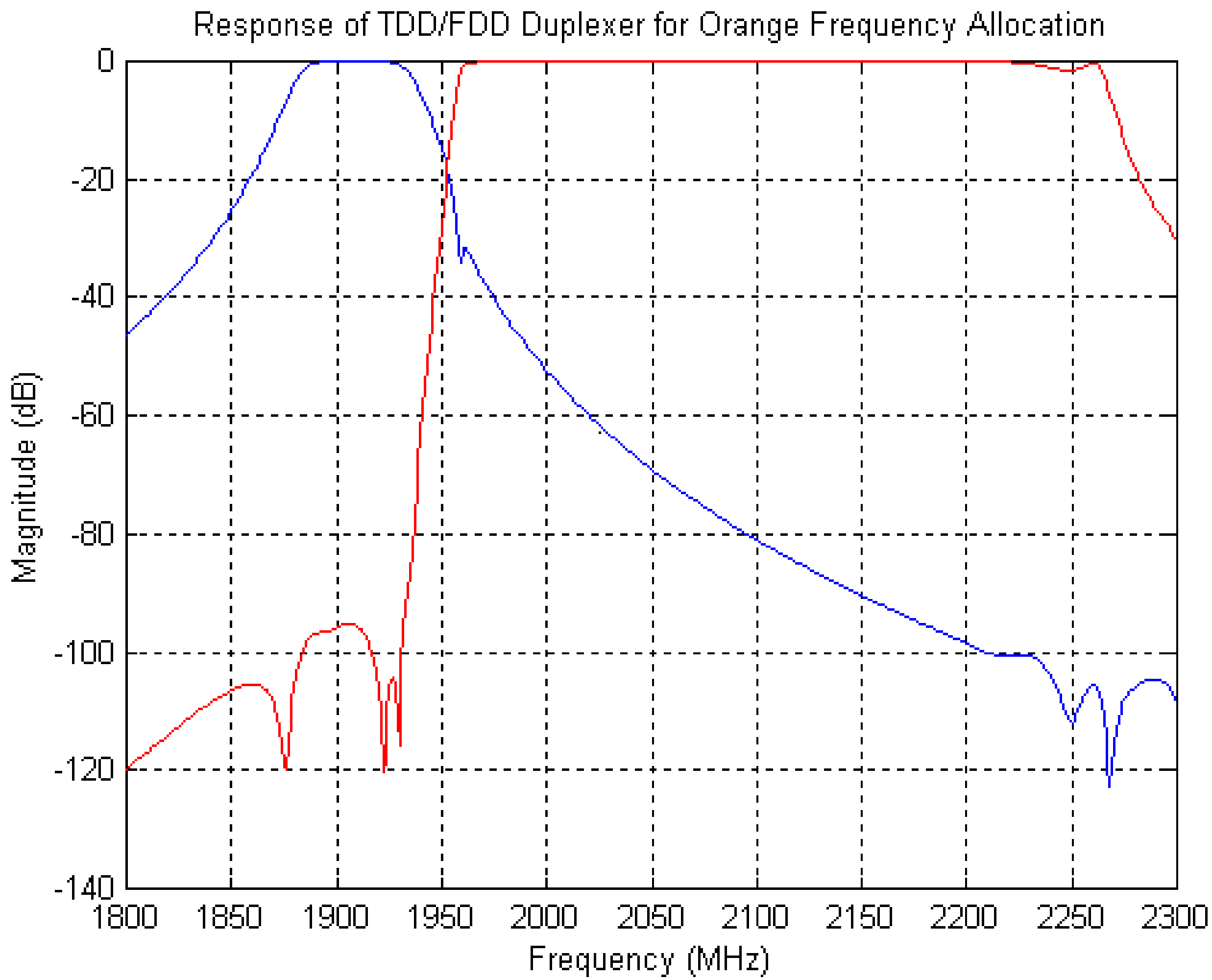




TDD transmit spectrum satisfies 3GPP TDD ACLR for co-siting -80dBm (TS25.105 section 6.6.2.2.3) (with +34dBm transmit power)

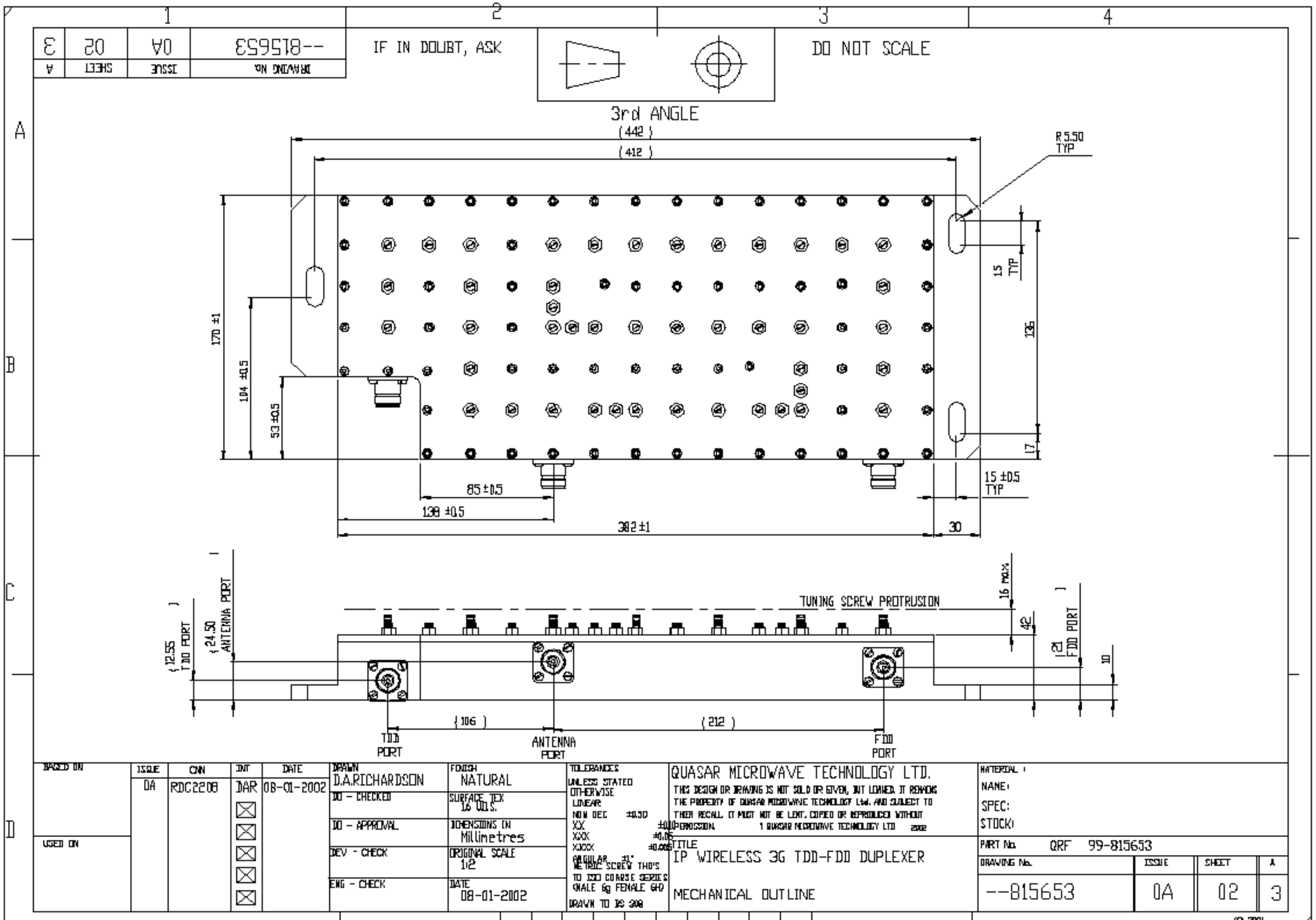
FDD Macro TDD Macro Antenna Sharing -2

Duplexer Response



FDD Macro TDD Macro Antenna Sharing - 3

Duplexer Construction



FDD Macro TDD Macro Co-siting - 1

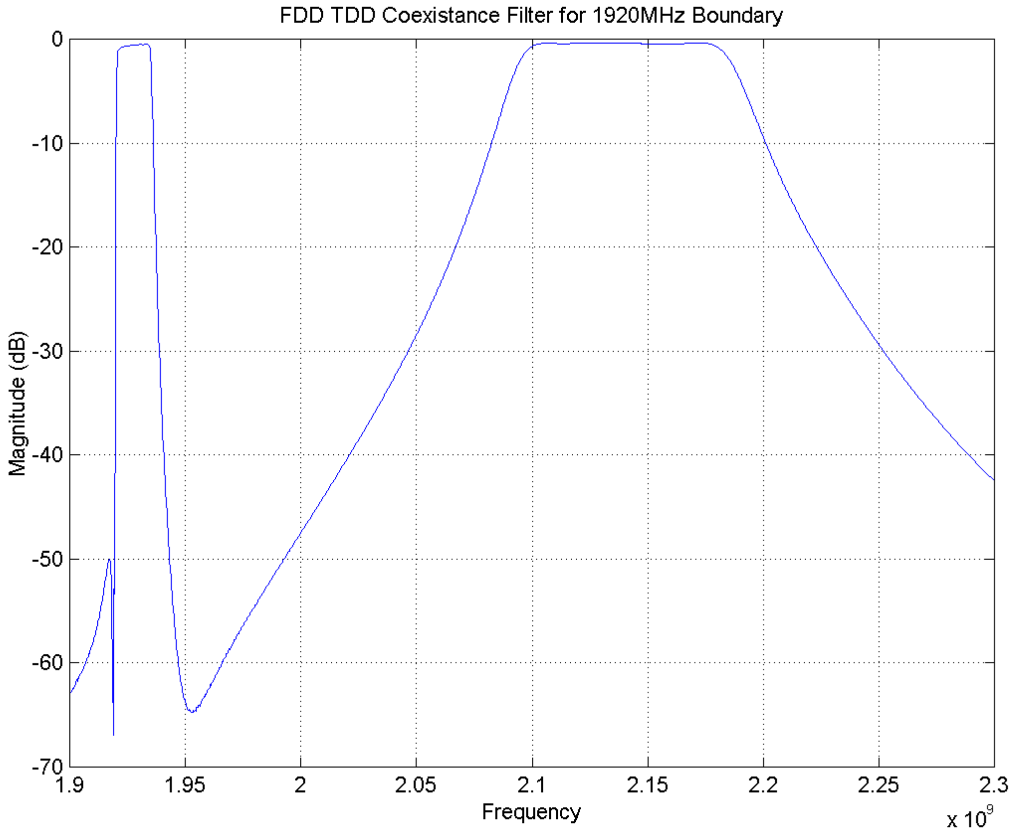
Measured Antenna Isolation

Antenna Separation	Horizontal	Vertical
Same Package	30dB	-
0.3m	46dB	-
0.5m	48dB	55dB
1.0m	56dB	64dB
1.5m	58dB	65dB
2.5m	63dB	66dB

Typical Co-siting Isolation ~48dB

FDD Macro TDD Macro Co-siting - 2

Additional Filter for FDD Receive with Adjacent Channel With 50dB Rejection for only 48dB Antenna Isolation



FDD Macro TDD Macro Co-siting - 3

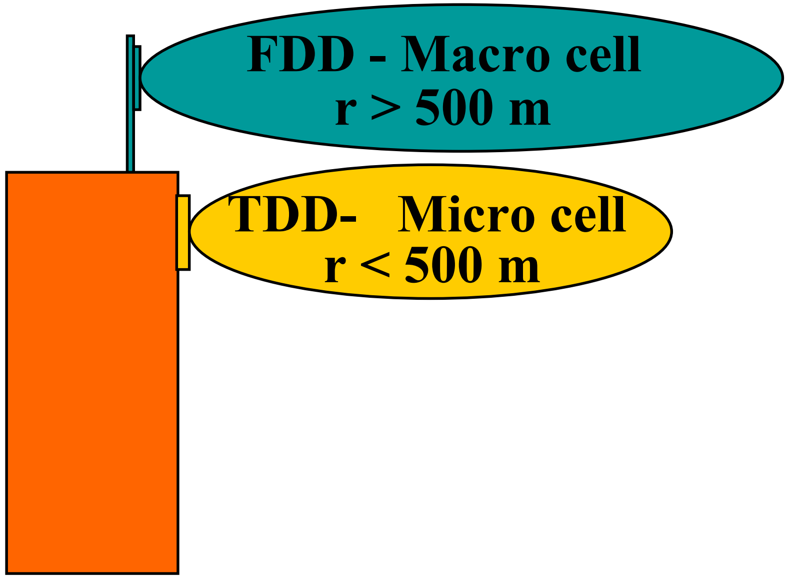
The Complication of Mast Head/Tower Top LNAs

- LNAs will be deployed in many FDD networks
- They are not covered by any 3GPP standard!
- By definition they are the first thing after the antenna
- They may be driven into nonlinearity by a high power interfering signal
- This could create in-band inter-modulation products that cannot be removed by subsequent filtering
- Therefore sufficient filtering of these signals must be performed before the Mast Head LNA
- This is filtering is included to protect against DCS1800 downlink in particular
- Typically sufficient filtering is provided by default in allocation specific Mast Head LNAs to facilitate co-siting

FDD Macro TDD Micro Co-siting - 1

- With FDD Macro and TDD Micro typically physical separation is all that is required to ensure interference free co-existence – NO ADDITIONAL FILTERING

Antenna isolation >78dB (free space) >88dB (vehicular) - ITU



Theoretical and Practical requirements

- The previous analysis was based on theoretical system performance of the FDD equipment.
- Many of these specifications have been designed to be easy to meet.
- There are several reasons why equipment may exceed the specifications, some identified earlier.
- IPWireless has extensively tested all co-existence scenarios with FDD operators the details of which are subject to NDA.
- General performance in the case of Node B to Node B can be summarised as follows .

TDD NB-FDD NB Minimum Isolation Required

Assuming +34dBm transmit power from TDD Node B

TDD channel	Theoretical Isolation For <1dB de-sense* FDD noise floor -104dBm	Practical Isolation For <1dB de-sense*
Adjacent channel 1917MHz	98dB	~70dB (~30dB with IPW coex filter)
All other channels 1902MHz, 1907MHz, 1912MHz	86dB	~35-55dB (dep. on channel/equip)

* Note isolation based on de-sense from thermal noise limited performance
The effect will be reduced in interference limited operation

Tested with all FDD Node Bs from the major vendors

Conclusions

- Practical experience indicates that in all cases except the adjacent channel co-siting FDD and TDD is a trivial problem and the isolation required can easily be provided often by default antenna isolation on the same mast.
- Antenna sharing is also feasible with appropriate duplexors
- In the case of the adjacent channel scenario co-siting is possible with FDD as a Macro layer and TDD as a micro layer this providing the required isolation.
- In the adjacent channel scenario FDD and TDD can both be employed as Macro layers and co-sited with additional filtering in the FDD receive which can be or is already included in TTLNAs deployed with FDD